Echo (in Shoreline)

Echo (in Shoreline) Overview

Volunteer monitoring began at Echo Lake in 2001 and was continued in 2004. The data indicate that this lake in the city of Shoreline is high in primary productivity (eutrophic) with fair water quality.

Echo Lake has no public access boat ramp, but car top boats may be launched from the city park. Residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious aquatic weeds.

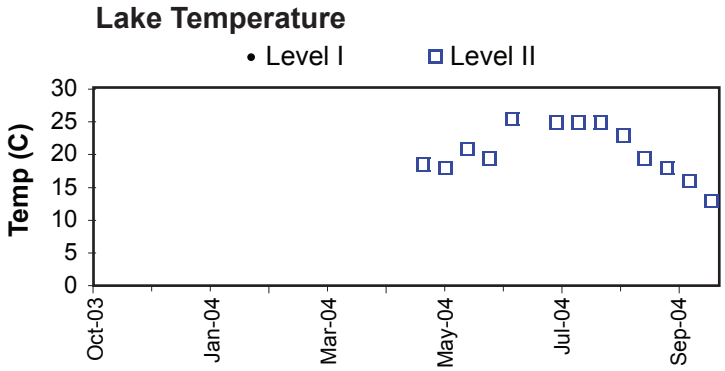
Physical Parameters

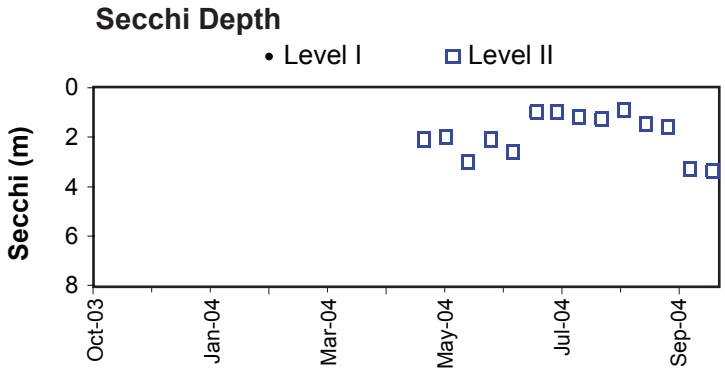
The Secchi transparency during the sampling season ranged between 0.9 and 3.4 m, averaging 1.9m which placed it in the lower end of the range of the small lakes monitored in 2004. Level II surface water temperatures reached 25.5 degrees Celsius in August, which was in the upper mid range for maximum temperature for the group.

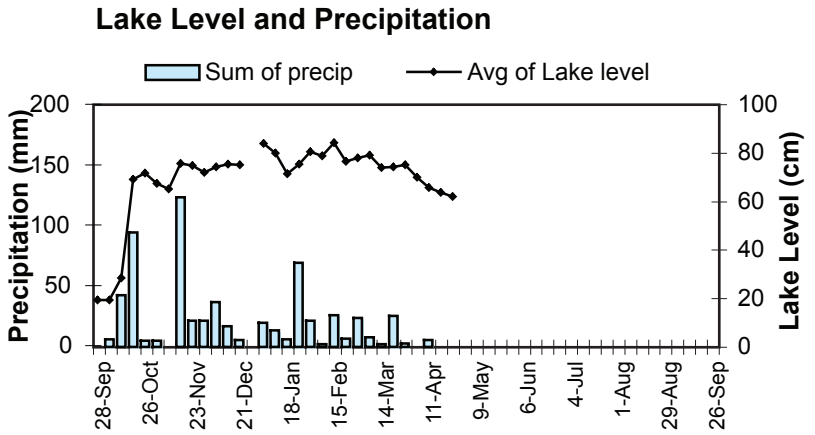
There were precipitation and water level records for the first part of the water year.

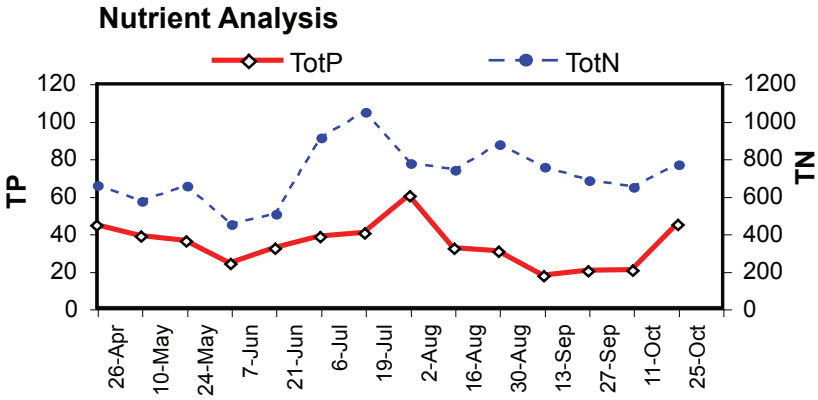
Nutrient Analysis and TSI Ratings

Both total nitrogen and phosphorus varied through the season. Nitrogen reached a peak in mid July with phosphorus lagging behind by two weeks. The N:P ratio ranged from 13 to 44, averaging 23 over the period which suggested there might be periods of good conditions for nuisance bluegreen growth. Many of the lowest values were found in the first part of the season.









Profile data indicate thermal stratification was strongly maintained through the summer, and there was an accompanying phosphorus build-up in the deep water. Chlorophyll data indicated that algae were approximately equal in concentration through the water column in late May, while there were more algae in the surface water at the end of August.

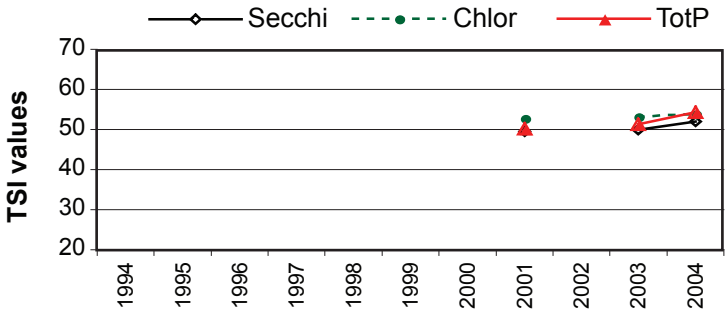
The 2004 TSI values were very close together above the threshold for eutrophy, similar to 2001 and 2003.

Chlorophyll Concentrations and Algae

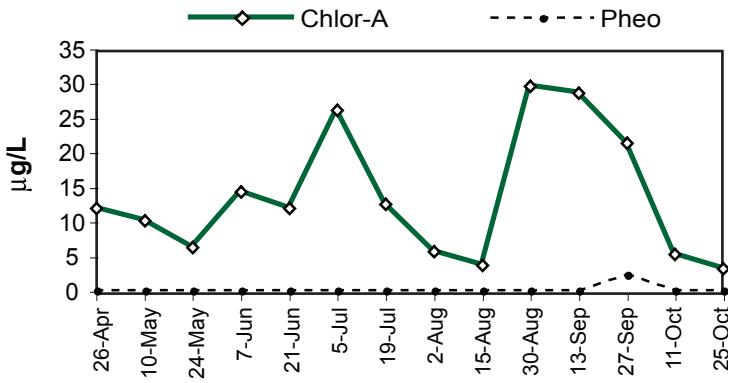
Chlorophyll content at 1m was quite variable through the season, with marked peaks in early July and late August. The phytoplankton community was dominated through much of the period by the bluegreen *Aphanizomenon flos-aquae,* with the colonial bluegreen *Aphanocapsa* accompanying in late August. The bluegreen *Anabaena*, which can make toxic blooms, was most abundant in September. Other common algae included the diatom *Asterionella formosa* and a variety of colonial chlorophytes.

Date	Secchi	depth-m	degC	Chlor-A	TP µg/L	TN µg/L
5/24/04	3.0	1	21.0	6.25	35.9	657
		4	17.0	7.69	52.1	633
		8.5	8.0	9.75	339.0	1390
8/30/04	0.9	1	23.0	29.50	30.2	879
		4	20.0	3.40	29.8	460
		8.5	9.0		709.0	2810

TSI Ratings



Chlorophyll a Concentrations (ug/L)



Common Algae

	Group
Anabaena limnetica	Cyanobacteria
Aphanizomenon flos-aquae	Cyanobacteria
Asterionella formosa	Bacillariophyta

Echo (in Shoreline)

2004 Level I Data

Daily Data Summary

Week of	Sum of precip. (mm)	# of days	Avg of lake level (cm)	# of days
28-Sep-03	0.0	4	19.5	5
5-Oct-03	6.0	6	19.6	7
12-Oct-03	43.0	7	28.5	7
19-Oct-03	95.0	7	69.5	6
26-Oct-03	5.0	7	72.0	7
2-Nov-03	5.0	7	67.9	7
9-Nov-03	0.0	7	65.3	7
16-Nov-03	124.0	7	76.0	4
23-Nov-03	22.0	7	75.3	7
30-Nov-03	21.5	4	72.3	6
7-Dec-03	37.0	7	74.6	6
14-Dec-03	17.0	5	75.6	6
21-Dec-03	6.0	3	75.3	2
28-Dec-03				
4-Jan-04	20.0	3	84.3	3
11-Jan-04	14.0	6	80.3	7
18-Jan-04	6.0	5	71.8	6
25-Jan-04	70.0	7	75.6	4
1-Feb-04	22.0	7	81.0	5
8-Feb-04	2.0	3	79.1	4
15-Feb-04	26.0	5	84.7	4
22-Feb-04	7.0	5	77.0	4
29-Feb-04	24.0	5	78.2	7
7-Mar-04	8.0	7	79.4	7
14-Mar-04	2.0	6	74.4	7
21-Mar-04	26.0	6	74.7	6
28-Mar-04	3.0	7	75.4	7
4-Apr-04	0.0	7	70.3	7
11-Apr-04	6.0	7	66.0	7
18-Apr-04	0.0	7	64.0	7
25-Apr-04	0.0	6	62.2	5
2-May-04				
9-May-04	0.0	0		
16-May-04	0.0	0		
23-May-04	0.0	0		
30-May-04	0.0	0		
6-Jun-04	0.0	0		
13-Jun-04	0.0	0		
20-Jun-04	0.0	0		
27-Jun-04	0.0	0		
4-Jul-04	0.0	0		
11-Jul-04	0.0	0		
18-Jul-04	0.0	0		
25-Jul-04	0.0	0		
1-Aug-04	0.0	0		
8-Aug-04	0.0	0		
15-Aug-04	0.0	0		
22-Aug-04	0.0	0		
29-Aug-04	0.0	0		
5-Sep-04	0.0	0		
12-Sep-04	0.0	0		
19-Sep-04	0.0	0		
26-Sep-04	0.0	0		
Min	0.0		19.5	
Max	124.0		84.7	
Total	617.5			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	Algae* (Shore)	Algae* (at site)	Goose Count*
5-Oct-03	13:00	1.5	20	P2	P2	25
23-Oct-03	13:40	1.5	17.0	P3	P2	0
Min		0.0	0.0			
Max		0.0	0.0			

* See introduction for discussion of algae assessment and goose count methods.

2004 Level II Data

Date (2004)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI		
								Secc	chl-a	TP
26-Apr	18.5	2.1	11.90	44.2	660	3	15	49.3	54.9	58.8
10-May	18.0	2.0	10.10	38.5	574	3	15	50.0	53.3	56.8
24-May	21.0	3.0	6.25	35.9	657	3	18	44.1	48.5	55.8
7-Jun	19.5	2.1	14.30	23.6	451	3	19	49.3	56.7	49.8
21-Jun	25.5	2.6	11.90	31.9	506	3	16	46.2	54.9	54.1
6-Jul	NR	1.0	26.10	38.2	913	3	24	60.0	62.6	56.7
19-Jul	25.0	1.0	12.50	40.1	1050	3	26	60.0	55.3	57.4
2-Aug	25.0	1.2	5.61	59.7	776	3	13	57.4	47.5	63.1
16-Aug	25.0	1.3	3.68	32.0	740	3	23	56.2	43.4	54.1
30-Aug	23.0	0.9	29.50	30.2	879	3	29	61.5	63.8	53.3
13-Sep	19.5	1.5	28.60	17.2	757	3	44	54.1	63.5	45.2
27-Sep	18.0	1.6	21.30	19.8	687	1	35	53.2	60.6	47.2
11-Oct	16.0	3.3	5.29	20.1	650	1	32	42.8	46.9	47.4
25-Oct	13.0	3.4	3.20	44.6	772	2	17	42.3	42.0	58.9
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae	N:P	Calculated TSI		
								Secc	chl-a	TP
Mean	20.5	1.9	13.6	34.0	719.4	2.6	23	51.9	53.8	54.2
Median	19.5	1.8	11.9	34.0	713.5	3	21	51.6	54.9	55.0
Min	13.0	0.9	3.2	17.2	451.0	1	13	42.3	42.0	45.2
Max	25.5	3.4	29.5	59.7	1050.0	3	44	61.5	63.8	63.1
Count	13	14	14	14	14	14	14	14	14	14

TSI Average = 53.3